

**A. CLASSIFICATION OF SUBJECT MATTER**

IPC 7 F01B9/02 F16H21/46 E05F15/12 B23B39/16 B23Q1/54

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 F01B E05F B23Q B23B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 25 52 258 A1 (GRUEKO KONSTRUKTIONEN GMBH) 2 June 1977 (1977-06-02) abstract; figures -----	1, 2, 21, 27
X	EP 0 402 967 A (SALVAGNINI TRANSFERICA S.P.A) 19 December 1990 (1990-12-19) the whole document -----	1, 27, 29-32
X	US 4 656 788 A (RHOADES ET AL) 14 April 1987 (1987-04-14) the whole document -----	1, 27, 29
X	US 4 733 432 A (NOVOSELSKY ET AL) 29 March 1988 (1988-03-29) the whole document -----	1, 2, 27, 28
	-/--	

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

## \* Special categories of cited documents:

\*A\* document defining the general state of the art which is not considered to be of particular relevance

\*E\* earlier document but published on or after the international filing date

\*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

\*O\* document referring to an oral disclosure, use, exhibition or other means

\*P\* document published prior to the international filing date but later than the priority date claimed

\*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

\*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

\*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

\*G\* document member of the same patent family

Date of the actual completion of the international search

9 May 2005

Date of mailing of the international search report

20/05/2005

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+31-70) 340-3016

Authorized officer

Westhues, T

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 798 024 A (GRIMM ET AL) 17 January 1989 (1989-01-17) column 3, lines 7-68; figure 1 -----	1,2,5,6, 27
X	US 5 163 789 A (WEBER ET AL) 17 November 1992 (1992-11-17) column 3, line 33 - column 4, line 8; figures -----	27,29
A	DE 198 12 789 A1 (RICHTER, JOACHIM) 30 September 1999 (1999-09-30) the whole document -----	1-58
A	US 6 154 916 A (AYERS ET AL) 5 December 2000 (2000-12-05) -----	

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
DE 2552258	A1	02-06-1977	NONE	
EP 0402967	A	19-12-1990	IT 1230288 B EP 0402967 A1	18-10-1991 19-12-1990
US 4656788	A	14-04-1987	CA 1242901 A1 DE 3568847 D1 EP 0178072 A1 JP 2111907 C JP 8000360 B JP 61168468 A	11-10-1988 20-04-1989 16-04-1986 21-11-1996 10-01-1996 30-07-1986
US 4733432	A	29-03-1988	NONE	
US 4798024	A	17-01-1989	DE 3424918 A1 EP 0167841 A2 JP 61033853 A	16-01-1986 15-01-1986 17-02-1986
US 5163789	A	17-11-1992	DE 4009735 A1 AT 104883 T BR 9100925 A DE 59005537 D1 EP 0445404 A2 ES 2055857 T3 HU 58588 A2 JP 2518970 B2 JP 4217451 A PT 96957 A , B RU 2032540 C1	12-09-1991 15-05-1994 05-11-1991 01-06-1994 11-09-1991 01-09-1994 30-03-1992 31-07-1996 07-08-1992 29-01-1993 10-04-1995
DE 19812789	A1	30-09-1999	NONE	
US 6154916	A	05-12-2000	NONE	